Precalc Warm Up # 1- 3

1. Describe the transformations of $g(x) = 2^x$ needed to get $f(x) = 2^{x-4} + 3$. Graph, label important features, and describe end behavior.

2. If you have $1000 to invest for 5 years, which investment is better: one that compounds interest monthly at 6.5%, or one that compounds continuously at 6.4% ? Support your answer!

HW Quizzes:

* Every Tuesday (unless there is a test).
* One problem selected from each assignment from the previous week.
* 2 points per problem scored on accurate process and answer.

* If you are absent (excused), you will turn in all the homework from the week. Due the day you return. Unexcused absence will score 0.

Best Preparation:

* Do homework everyday.
* Keep it organized... PC or SL book, page #, problem numbers, write original problem, keep it all in the same place so you can find it.
* Check your answers in the back of the book.
* Circle any problems you got wrong or didn't understand.
* Ask questions when we go over it in class.
* Visit the website to clarify anything you didn't totally get.
* Revisit and organize it for the week by Monday.
* Fix anything that needs fixing before Tuesday.

HW Questions: p. 259

In Exercises 1–14, use a calculator to evaluate the given quantity. Round your answers to three decimal places.

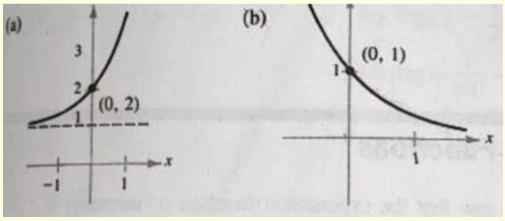
3. $1000(1.06)^{-5}$

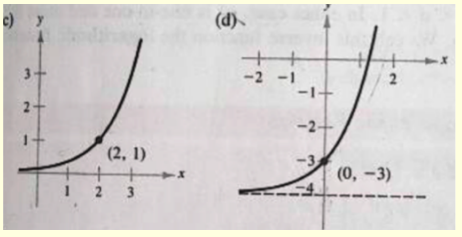
7. $8^{2\pi}$

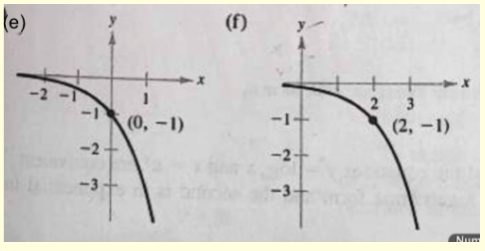
11. e^2

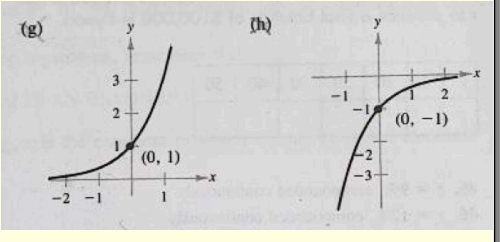
In Exercises 15–22, match the exponential function with its graph. [The graphs are labeled (a)–(h).]

15. $f(x) = 3^x$
16. $f(x) = -3^x$
17. $f(x) = 3^{-x}$
18. $f(x) = -3^{-x}$
19. $f(x) = 3^x - 4$
20. $f(x) = 3^x + 1$
21. $f(x) = -3^{x-2}$
22. $f(x) = 3^{x-2}$









In Exercises 23–40, sketch the graph of the given exponential function.

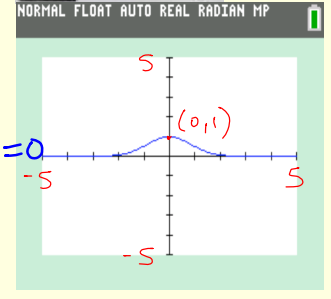
23. $g(x) = 5^x$

27. $h(x) = 5^{x-2}$

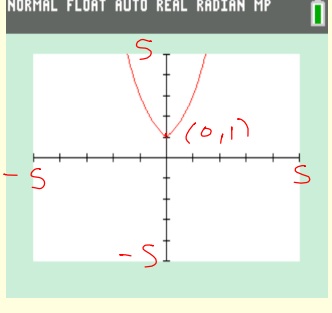
$y = \left(\frac{1}{2}\right)^{x^2}$

x	y
0	1
±1	$\frac{1}{2}$

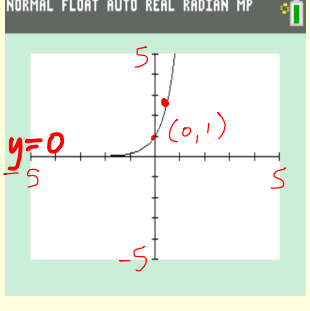
31. $y = 2^{-x^2}$



33. $y = 3^{|x|}$



37. $f(x) = e^{2x}$



x	y
$-\frac{1}{2}$	e
1	

In Exercises 41–44, complete the following table to determine the balance A for P dollars invested at rate r for t years and compounded n times per year.

n	1	2	4	12	365	Continuous compounding
A						Pe^{rt}

43. $P = \$2500$, $r = 12\%$, $t = 20$ years

$n = 1$

$$A = 2500\left(1 + 0.12\right)^{20}$$

$n = 2$

$$A = 2500\left(1 + \frac{0.12}{2}\right)^{2(20)}$$

49. The demand equation for a certain product is given by

$$p = 500 - 0.5e^{0.004x}.$$

Find the price p for a demand of (a) $x = 1000$ units and (b) $x = 1500$ units.

53. Given the exponential function $f(x) = a^x$, show that

(a) $f(u + v) = f(u) \cdot f(v)$ (b) $f(2x) = [f(x)]^2$.

$a^{u+v} \stackrel{?}{=} a^u \cdot a^v$

$a^{u+v} = a^{u+v}$ ✓

b) $a^{2x} \stackrel{?}{=} [a^x]^2$

$a^{2x} = a^{2x}$ ✓

Definition of a LOGARITHM:

$y = \log_a x$ iff $x = a^y$

a must be positive and $\neq 1$, and x must be positive

A logarithm is an exponent.

$\log_3 81 =$ exponent

Means: The exponent on the base, 3, needed to get 81.

$\log_3 81 = 4$ because $3^4 = 81$

Evaluate:

$\log_3 3 = 1$ $\quad \log_2 16 = 4$ $\quad \log_3 1 = 0$

$\log_8 8 = 1$ $\quad \log_5 25 = 2$ $\quad \log_8 1 = 0$

$\log_{17} 17 = 1$ $\quad \log_{25} 5 = \frac{1}{2}$ $\quad \log_{17} 1 = 0$

$\log_2 2^5 = 5$ $\quad \log_3 3^2 = 2$ $\quad \log_{17} 17^5 = 5$

Log Properties:

Base

$a > 0, a \neq 1$

$\log_a a = 1$

$\log_a 1 = 0$

$\log_a a^x = x$

Evaluate:

$\log_4 2 = \frac{1}{2}$

$\log \frac{1}{100} = \log_{10} 10^{-2} = -2$

$\log_2(-8)$ is undefined.

$2^? \neq -8$

$\log_{10} 1000 = 3$

$\ln 1000 = \log_e 1000$

$e^? = 1000$

$(2.7)^? = 1000$

$\ln 1 = 0$

$\ln e = 1$

Find the inverses of each, and graph both on the same set of axes:

1. $y = 2x - 6$

$x = 2y - 6$

$y = \frac{1}{2}x + 3$

2. $y = \sqrt{x+4}$

D: $x \geq -4$

R: $y \geq 0$

$x = \sqrt{y+4}$

$x^2 = y + 4$

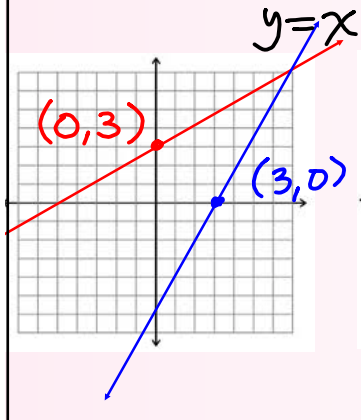
$y = x^2 - 4;\ x \geq 0$

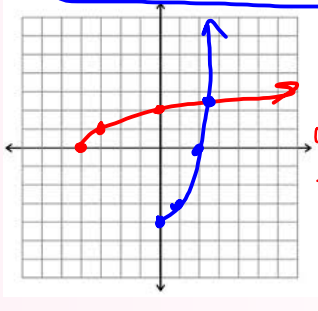
3. $y = 2^x$

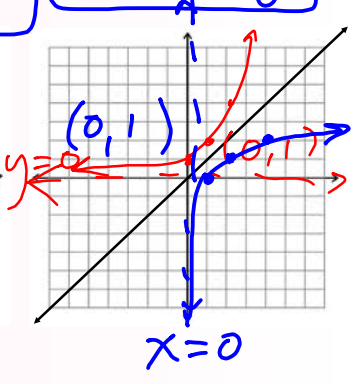
$x = 2^y$

change to log form

$\log_2 x = y$







Writing the inverse of $f(x) = 2^x$

$y = 2^x$

inverse: $x = 2^y$

write it in log form to solve for y:

$y = \log_2 x$

$f^{-1}(x) = \log_2 x$

How are the graphs of $f(x)$ and $f^{-1}(x)$ related?

They are each a reflection of the other in the line $y = x$

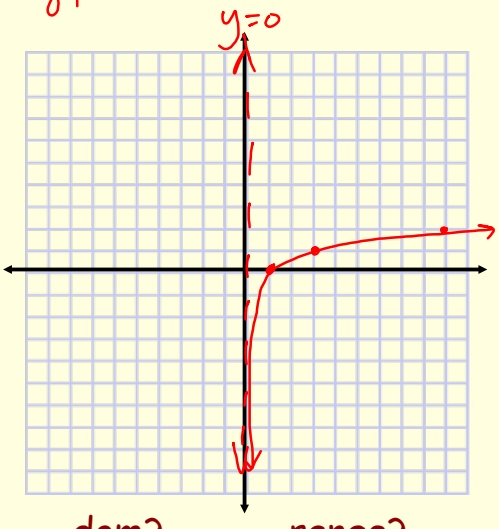
Domain of $f(x)$ = range of $f^{-1}(x)$

Range of $f(x)$ = domain of $f^{-1}(x)$

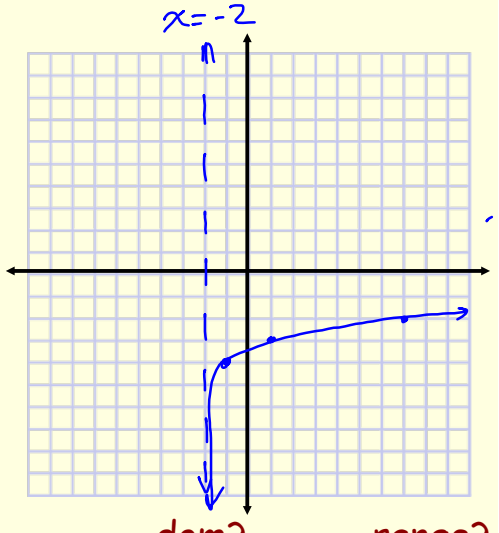
Graph $f(x) = \log_3 x$ and $g(x) = \log_3(x+2) - 4$

Left 2, down 4

x	1	3	9
y	0	1	2



dom? $x > 0$ range? $y = \mathbb{R}$



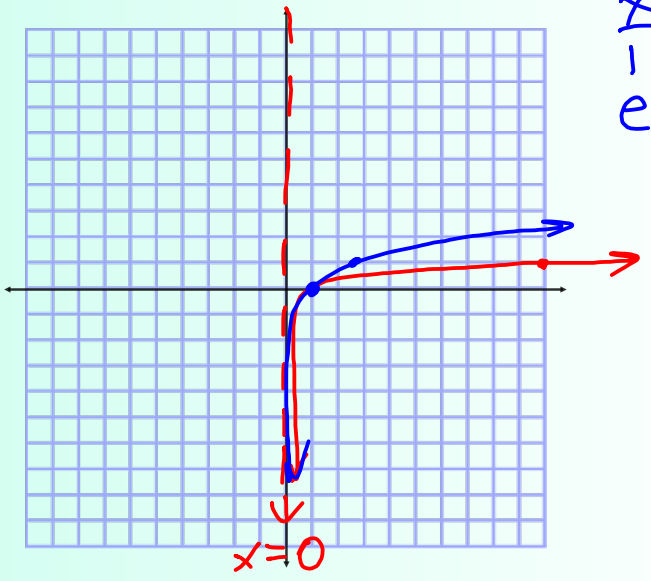
dom? $x > -2$ range? $y = \mathbb{R}$

How do the graphs of

$f(x) = \log_{10} x$ and $g(x) = \ln_e x$ compare?

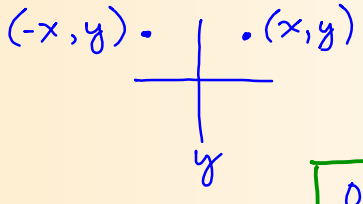
x	y
1	0
10	1

x	y
1	0
e	1

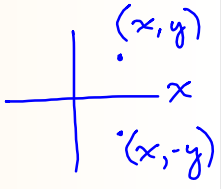


Compare the following functions to $y = \log x$

$y = \log(-x)$ r_y



$y = -\log x$ r_x



$y = \log(x - 3)$

Rt. 3

Order of Transformations:

- Dilations
- Reflections
- Shifts

$y = \log(3 - x)$

$y = \log[-(x - 3)]$

r_y then Rt. 3

HW: PC Book

p. 269 #1-15 odd, 17-35 □,

#37 - 42 all, 45, 50, 67, 69

Your course syllabus can be found online at:

nicholsonsehs.wikispaces.com